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Effect of wood vinegar on nitrification and Kimchi cabbage (*Brassica campestris* var. *Pekinensis*) growth in urea-fertilized soil

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Urea is rapidly hydrolyzed by urease in soil to produce ammonium ions. The ammonium ion is oxidized to nitrate by soil microorganisms, which can be taken up by plants. However, excess nitrate can be lost by leaching and causes greenhouse gas emissions. Therefore, it is important to control nitrification in soil. The purpose of this study was to evaluate the effect of wood vinegar (WV), which is known as a urease inhibitor, on urea hydrolysis and nitrification under laboratory conditions, and the effect of wood vinegar on the growth of Kimchi cabbage in a field environment. In laboratory and field experiments, soil was treated with urea and the effect of WV was compared with NBPT, a commercial urease inhibitor. The field experiment was performed on 4 treatments (100% Urea, 50% Urea, 50% Urea+WV, and 50% Urea+NBPT) to evaluate the effect of WV on Kimchi cabbage growth and nitrogen use efficiency. In the incubation experiment, WV effectively inhibited nitrification compared to the NBPT. In the field experiment, nitrate concentrations in the soils treated with WV (50% Urea+WV) and NBPT (50% Urea+NBPT) after Kimchi cabbage harvest were not significantly different from the conventional treatment group (100% urea), although half amount of urea was applied. The total nitrogen content of Kimchi cabbage in the WV treatment group (34.0 mg N g^{-1} dw) was lower than the conventional treatment group (39.8 mg N g^{-1} dw), but there was no significant difference in fresh weight (3.5 kg and 3.0 kg, respectively). It is suggested that WV treatment increased nitrogen use efficiency of Kimchi cabbage by inhibiting nitrification. Therefore, WV can effectively prevent the nitrogen loss and extend the lifespan of inorganic nitrogen available to plants by controlling the nitrification rate in the soil.